UNIVERSITY OF CAMBRIDGE INTERNATIONAL EX
International General Certificate of Secondary Educati

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CAN NUMBER

1783323183

ENVIRONMENTAL MANAGEMENT **0680/41**

Alternative to Coursework **October/November 2013**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Ruler

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

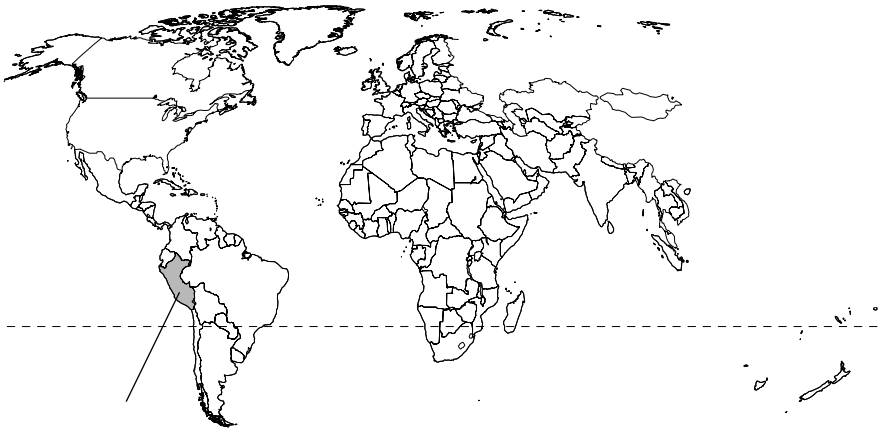
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

This document consists of **18** printed pages and **2** blank pages.

© UCLES 2013

world map



map of Peru



© UCLES 2013

Area of Peru: 1 285 216 sq km

Population: 30 million

Children per woman: 2.6

Life expectancy: 74 years

Currency: soles (2.9 = 1US$)

Language: Spanish, indigenous languages

Climate: driest in the west, cold mountains in the centre, equatorial in the east

Terrain: western coastal plain, high Andes mountains in the centre, eastern lowlands in the Amazon Basin

Main exports: minerals, such as copper, gold, zinc and many others, fishmeal and agricultural produce.

Peru is a developing country with large mineral resources in the Andes mountains. The coastal waters are excellent fishing grounds. Economic growth has resumed after the world recession and levels of poverty have been reduced in recent years. Peru has developed many trade links with other countries.

© UCLES 2013

1 **(a)** What are the advantages for Peru of improved trade links wit

.....

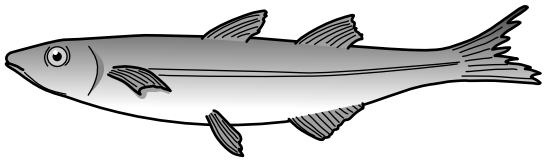
.....

.....

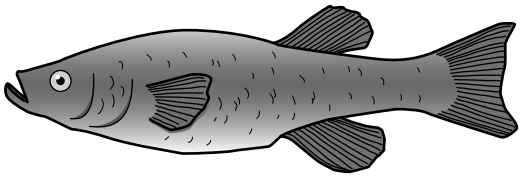
.....

(b) Lake Titicaca is a large lake at 3800 m above sea level. Man
farm the surrounding land; other communities fish in the lake or carry out informal mining along the rivers that flow into the lake.

The lake has provided a supply of fish to local people for many years. Some fish are also sold in markets in local towns. To increase the fish catch a new species called 'pejerrey' was introduced. They are now caught in large numbers. However, a native fish species called 'carache' is now rarely caught, although it was common in the past.



pejerrey fish



carache fish

(i) Suggest how the introduction of new species like pejerrey could alter the natural lake ecosystem.

.....

.....

.....

.....

.....

..... [3]

© UCLES 2013

The pejerrey is now the main fish caught and sold in l
fish is only used to make soup. Some people were wo
not safe to eat as a result of mining in the surrounding
scientist to test fish muscle for mercury (a heavy metal).

The scientist used the following method:

- catch fish of both species in five different locations
- visit three fish markets and buy fish of both species
- record the length of all these fish
- remove a piece of muscle tissue of the same size from just behind the gills of each fish
- pack the muscle samples in ice and send to the laboratory

(ii) Suggest why the scientist collected fish from three markets as well as catching fish.

.....

..... [1]

(iii) Why did the scientist pack the muscle samples in ice?

.....

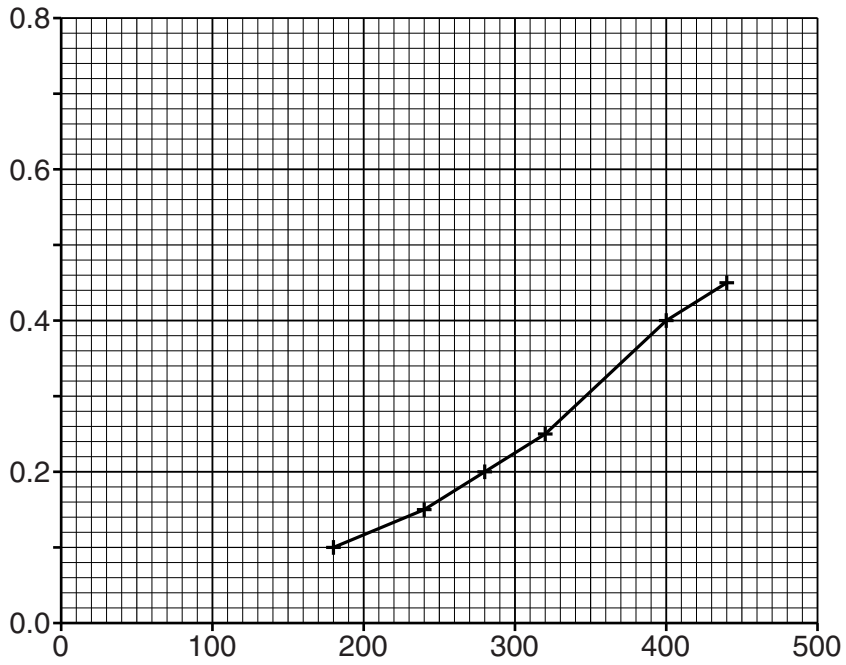
..... [1]

© UCLES 2013

(iv) The average (mean) results for analysis of the fish of diff
the table below.

pejerrey fish		carach	
length/mm	average mercury concentration of fish/ppm	length/mm	
180	0.10	100	
240	0.15	120	0.20
280	0.20	140	0.35
320	0.25	160	0.50
400	0.40	180	0.70
440	0.45		

Complete the graph below by labelling the axes, plotting the results for the carache fish and completing the key.



Key

pejerrey fish

carache fish

[3]

© UCLES 2013

(v) The safe limit for mercury concentration in fish that are b

Show clearly on the graph the maximum length for ea
eaten. Write the maximum length that can safely be eate

pejerrey fish ..... carache fish .....

(vi) Suggest reasons to explain the relationship between fish length.

.....

.....

.....

..... [2]

(c) The scientist discovered that a mining community 100 km from the lake was using mercury to extract gold from a river flowing into Lake Titicaca. He took water samples at intervals down the river between the mining community and the lake. The results are shown in the table.

distance downstream from the mining community / km	mercury concentration in the river / ppm
1	580
10	92
40	10
60	2
80	1
100	1

The scientist decided that this mining was not the main source of mercury entering Lake Titicaca. Explain why he came to this decision.

.....

.....

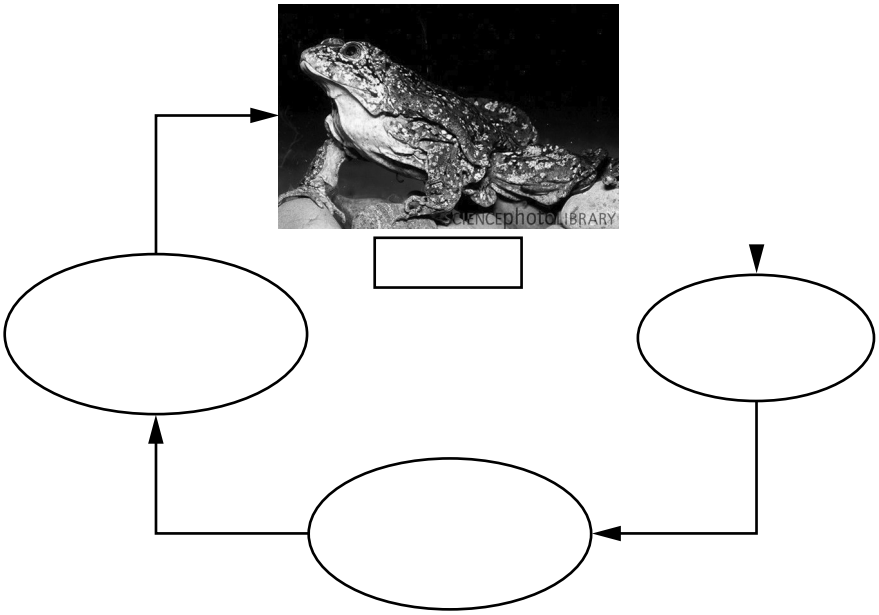
.....

..... [2]

© UCLES 2013

(d) Lake Titicaca is the habitat of many endemic species (found
One of these species, the Lake Titicaca frog, is endanger
decline.

life cycle of the Lake Titicaca frog



When visiting the local markets the scientist noticed that some frogs were for sale. He decided to carry out another survey of six markets to try to estimate how many frogs were being caught for sale in the area. He decided not to buy any frogs.

(i) Why did the scientist decide not to buy any frogs?

.....

..... [1]

(ii) Describe how the scientist should undertake the survey to achieve his aim.

.....

.....

.....

.....

.....

..... [3]

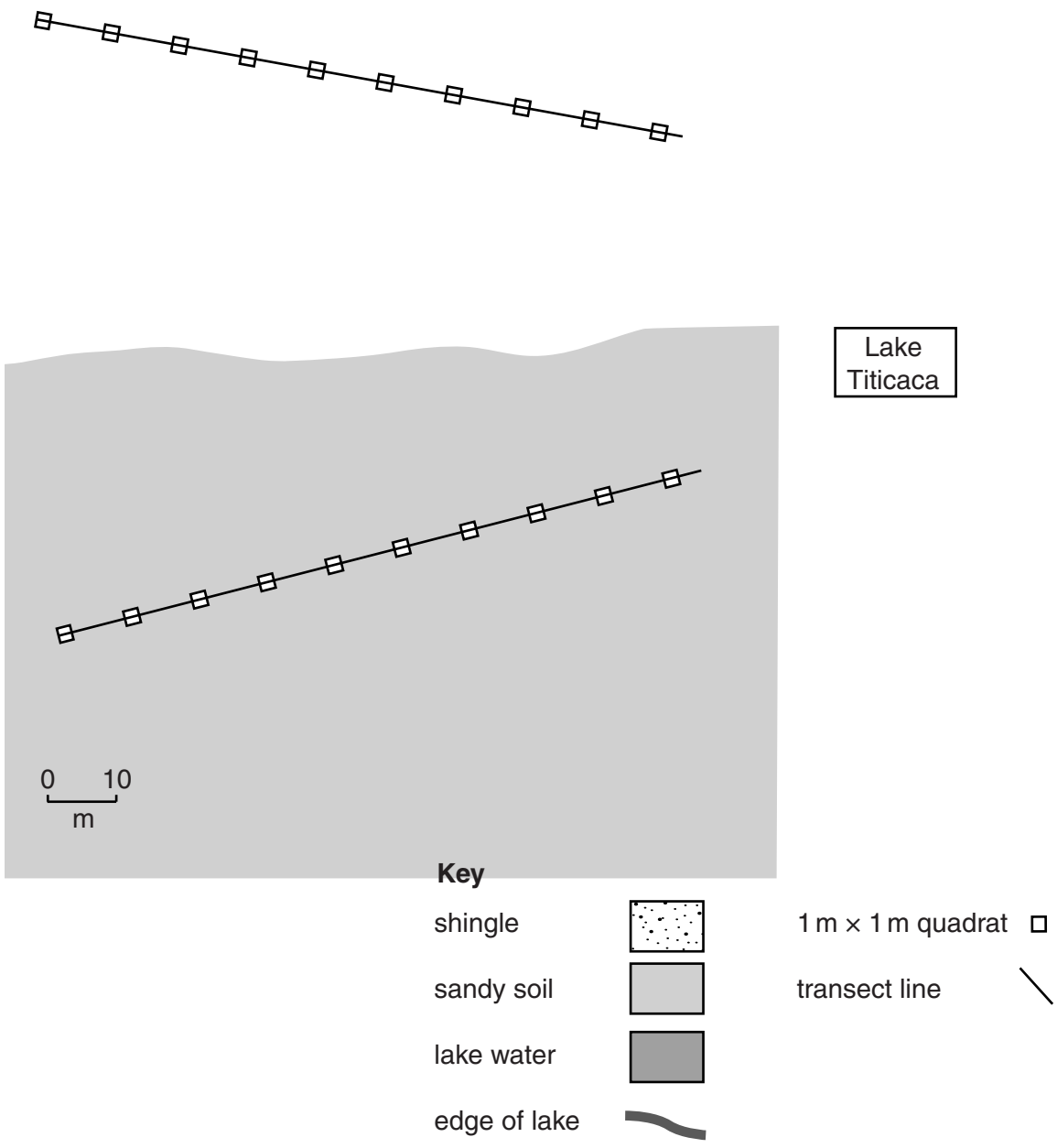
© UCLES 2013

(iii) In the space below, draw a table that could be used t survey of six markets.

[3]

© UCLES 2013

(e) Next, the scientist carried out a survey of the frogs' habitat, map.



The scientist carried out the following tasks, but not in the order given below:

A collect ten 1 m × 1 m square quadrats

B place a 40 m tape on the ground, laid out at 90° to the shoreline

C count all the young and adult frogs

D catch all the young and adult frogs in each quadrat

E place quadrats at 4 m intervals along the tape

F release the animals back into their habitat

G take a pH reading from the soil in each quadrat

© UCLES 2013

(i) The statements **A** to **G** are not in the correct order. Ar suitable order in the boxes below. One has been done fo

steps 1	2	3	4	5
.....	.....	.....	.....	.....

The results of the survey are shown in the table below.

soil	frog	quadrat sample										average (mean) number of frogs
		1	2	3	4	5	6	7	8	9	10	
shingle	young	4	3	4	6	5	3	3	0	5	5	3.8
shingle	adult	1	2	1	3	1	2	1	1	2	2	1.6
sandy	young	6	3	5	4	2	4	3	5	5	4	.....
sandy	adult	4	3	1	1	2	3	1	1	3	1	.....

(ii) Complete the table.

Space for working.

Write your answers in the spaces in the table. [1]

(iii) Which quadrat sample does not fit the general pattern of results?

..... [1]

(iv) Suggest why there are more young frogs than adults.

.....

..... [1]

© UCLES 2013

(v) The scientist studied the results carefully. What conclusio

.....

.....

.....

.....

(vi) Suggest how the scientist could carry out more research

.....

.....

.....

.....

.....

..... [3]

(f) Some frogs were collected to breed in captivity in a local zoo.

(i) What are the advantages of breeding animals in captivity?

.....

.....

.....

..... [2]

(ii) What else could be done to help conserve this endangered species for the future?

.....

..... [1]

[Total: 36]

© UCLES 2013

2 **(a)** About 120 000 people live in the city of Puno. Many of the along the edge of the lake. Less than half the city has a dail means that a large amount of waste finds its way into the lak

percentage of different types of waste produced i

type of waste	percentage of total wa
organic matter	30
plastic bags	13
plastic bottles	6
tins	8
glass	7
pottery	4
shoes	5
iron	20
other types of waste	.....
total	100

(i) In the table, state the percentage of other types of waste.

Space for working.

Write your answer in the space in the table. [1]

(ii) Select one type of waste from the survey and describe how it can be recycled.

.....

.....

.....

..... [2]

(iii) What are the environmental advantages of recycling some waste materials?

.....

.....

.....

..... [2]

© UCLES 2013

(b) Some people try to make a living collecting materials from waste tips to sell.

flow diagram to show how selling waste is org

collectors ⟶ local middlemen ⟶ wholesalers

waste material	price / soles per kilogram		
	local middlemen pay collectors	wholesalers pay middlemen	factories or exporters pay wholesalers
mixed paper	0.15	0.20	0.36
newspaper	0.15	0.18	0.30
cardboard	0.15	0.25	0.40
plastic	0.80	1.20	1.50
iron	0.40	0.60	1.00

(i) Which recyclable material is least profitable for **wholesalers** to buy and sell? Explain your answer.

.....

.....

.....

..... [2]

(ii) Much of the iron waste and plastic waste is exported, whereas the other wastes are not.

Suggest reasons for this.

.....

.....

.....

..... [2]

© UCLES 2013

(c) Children often help their parents sort waste materials for s harmful wastes inside them. Industrial and hospital wastes ma waste.

Look at the comments of the children.

'Sometimes I go to work with my mother on the waste plastic bottles; we have to take plastic rings off the neck small fire to melt plastic rings off these bottles.'

'I work fulltime and do not go to school now. I collect and sort hospital waste. I dismantle syringes. Next year I hope to start work on a waste truck and be paid a wage.'

Why is the health risk high, especially for children?

.....

.....

.....

..... [2]

© UCLES 2013

(d) A student wanted to find out how much money waste colle
To make sure he interviewed each waste collector in the s
questionnaire for each interview.

He asked them questions and then recorded the answers on

How many hours do you collect waste in one day?	1–3	4–5	6–7	8	
answers	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸
How many kilograms of plastic are collected?	4–6	7–9	10–12	13–15	
answers	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	
How many kilograms of cardboard are collected?	3–5	6–8	9–11	12–14	15–17
answers	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸	𝍸

𝍸 𝍸 𝍸 𝍸 = 5

(i) How many waste collectors were asked the questions?

..... [1]

(ii) The average amount of plastic collected was 8 kg per collector and 11 kg for cardboard.

Using this information, and the prices in the table on page 14, how much is one collector paid by the local middlemen for 8 kg of plastic and 11 kg of cardboard?

Space for working.

plastic .....

cardboard .....
[2]

© UCLES 2013

(e) Many tourists already come to Puno and Lake Titicaca. T
increase numbers further. Tourists often complain about the

The city authorities estimate that only 23% of households car

They proposed the following plan which included:

- buying more waste trucks
- building more waste recycling centres
- building special waste pits lined with plastic outside the city

(i) How could this plan help to make the city more attractive to tourists?

.....

..... [1]

(ii) How could the city authorities make money from the plan?

.....

..... [1]

(iii) How could the population of Puno benefit from the plan?

.....

..... [1]

(iv) Some of the waste collectors do not like this plan. Suggest why.

.....

.....

.....

..... [2]

© UCLES 2013

Factsheet about the Puno area

- Livestock farming dominates the area around
- Where crops are grown, lake water for irrigat
- Only 10% of households have a piped water
- Tourists hire boats to go sport fishing in the l
- Some tourists stay with local families
- Tourists walk around the lake to see the birdlife

(v) Suggest a development plan that encourages tourism, but prevents further damage to the environment and does not change local people's way of life.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[Total: 24]

© UCLES 2013

BLANK PAGE

© UCLES 2013

BLANK PAGE

Copyright Acknowledgements:

© Ref: Z700 / 0608; *Titicaca frog (Telmatobius culeus)*; Dante Fenolio / Science Photo Library.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2013